

THE MOUNTAIN ELEMENT IN THE FLORA OF THE PENINSULA OF VIRGINIA*

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The Peninsula of Virginia is a narrow neck of land about 60 miles long lying southeast of Richmond. It is bounded by Hampton Roads and the Chesapeake Bay on the east, by the York River estuary on the northeast, and by the James River on the southwest. Although some of the earliest floristic work in this country was done on The Peninsula of Virginia, little was accomplished after the colonial period until Professor and Mrs. E. J. Grimes made extensive collections in 1921-22. Professor M. L. Fernald and his colleagues did some collecting in the area some years later, but it was largely by-passed by them for the richer possibilities to the south of the James River. The writer was fortunate to have the opportunity to study the distribution of plants on The Peninsula while at the College of William and Mary in Williamsburg in the summer of 1964.

A very intriguing phytogeographic element in the flora of the region is composed of species which occur on the coastal plain and are rare or unknown on the piedmont of Virginia, but reoccur in the mountains of the Virginia-Carolina area. This element has a long history in the literature and is discussed in some detail by Pennell (1935), Braun (1937), Fernald (1937), and by other botanists.

Recent botanical activity in Virginia and the Carolinas enable us to gain a clearer picture of the phytogeographic relations and history of the coastal plain - mountain element and some eighteen species with this distribution pattern are discussed in this paper. These species are placed in 4 groups, (1) wide-ranging, (2) chiefly of northern distribution, (3) chiefly of southern distribution, or (4) endemic to the Virginia-Carolina area. Within these groups the species are

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arranged according to their distribution in the Carolinas (Radford, Ahles and Bell, 1964) because the distribution of the flora of the Carolinas appears to offer some possibilities for an explanation of some of the disjunct distributional patterns in the Virginia flora.

DISJUNCT SPECIES OF THE PENINSULA OF VIRGINIA

I. Wide-ranging species north and south.

Species of the piedmont and mountains in the Carolinas: *Actaea pachypoda* Ell.; *Agrimonia pubescens* Wallr.; *Campanula americana* L.; *Dirca palustris* L.; and *Sanicula marilandica* L.

Species chiefly of the coastal plain and mountains in the Carolinas: *Habenaria ciliaris* (L.) R. Br.

II. Species generally of northern distribution.

Species of the piedmont and mountains in the Carolinas: *Isotria medeoloides* (Pursh) Raf. and *Lathyrus venosus* Muhl.

Species of the coastal plain, piedmont and mountains in the Carolinas: *Comptonia peregrina* (L.) Coulter.

Species chiefly in the mountains in the Carolinas: *Aralia racemosa* L.

III. Species generally of southern distribution.

Species of the piedmont and mountains in the Carolinas: *Monotropsis odorata* Ell.

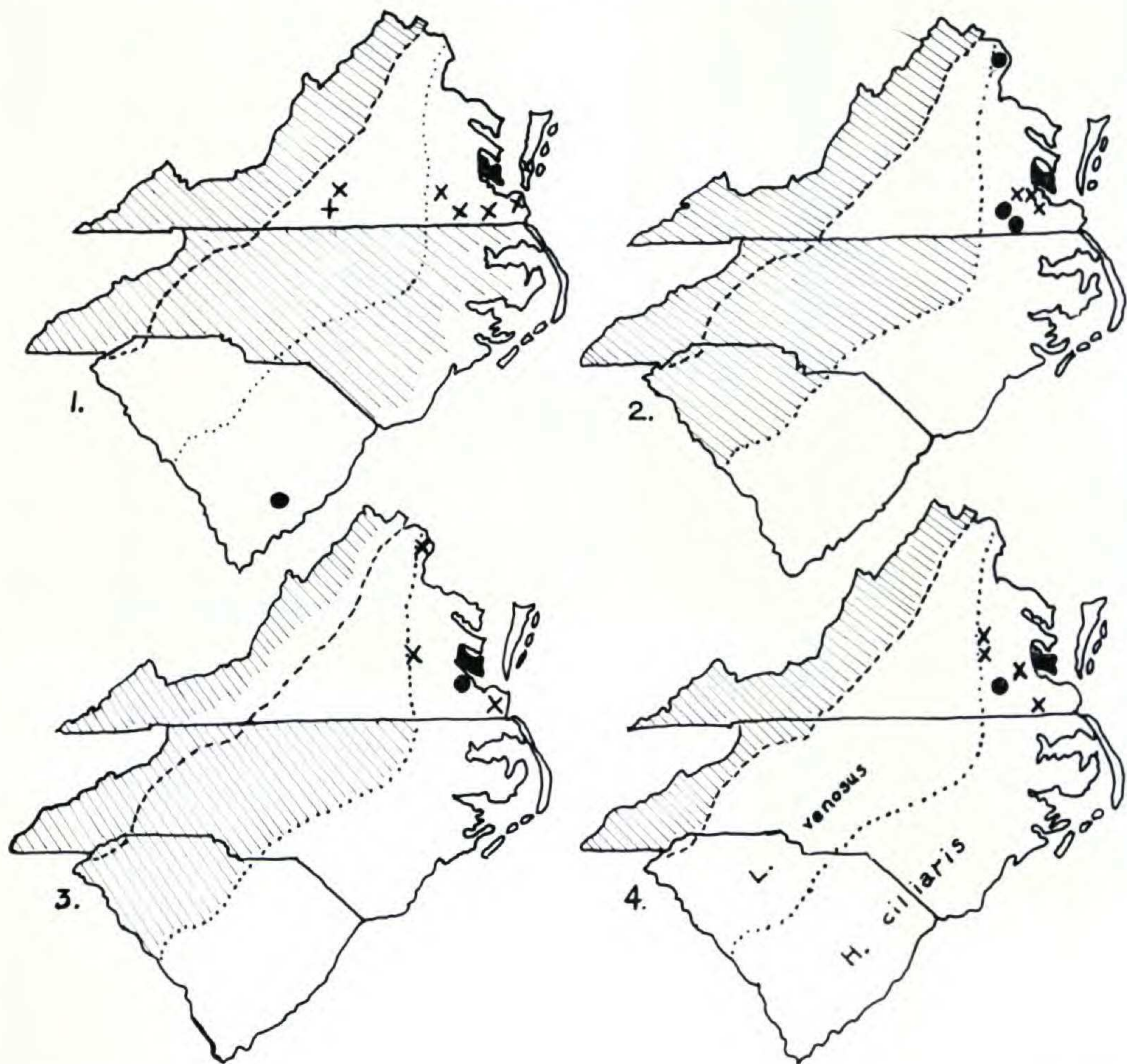
Species of the coastal plain, piedmont and mountains in the Carolinas: *Callicarpa americana* L.; *Galax aphylla* L.; *Helenium brevifolium* (Nutt.) Gray (including *H. curtissii* Gray) and *Magnolia tripetala* L.

Species chiefly in the mountains in the Carolinas: *Parnassia asarifolia* Vent. and *Stewartia ovata* (Cav.) Weath.

IV. Endemic to the Virginia-Carolina area: *Chelone cuthbertii* Small. Apparently bicentric, the known occurrence of the *Chelone* is on the coastal plain of Virginia and in the mountains of North Carolina.

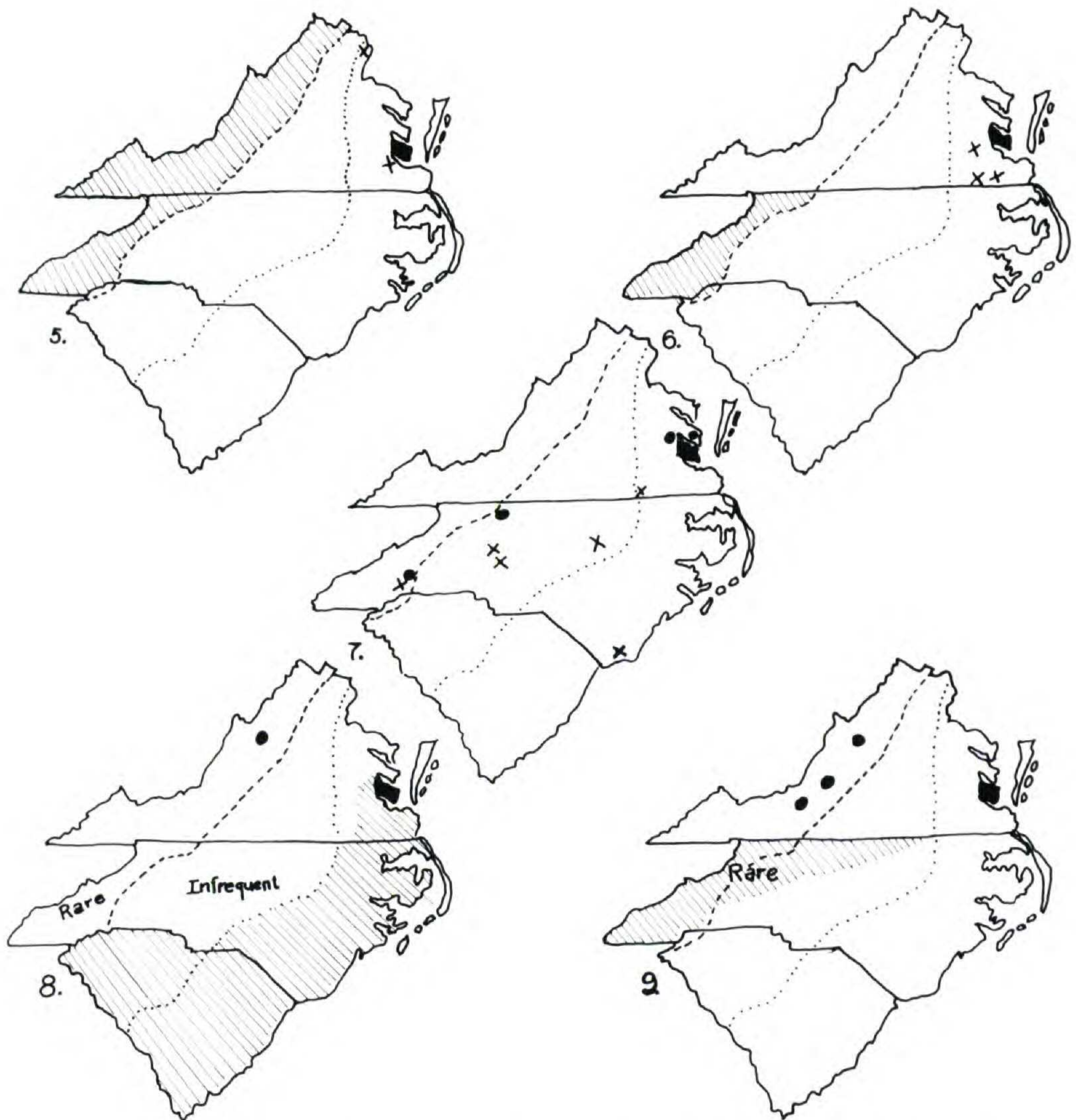
Other species of The Peninsula belong to the coastal plain-mountain element but their distribution is as yet not so well documented. Also, numerous other species found south of the James River on the coastal plain have disjunct colonies in the mountains but are not included in this study.

Five of the eighteen species mapped in this paper are known from the mountains of the Carolinas, but not from those of Virginia; they are *Helenium brevifolium*, *Isotria medeoloides*, *Monotropsis odorata*, *Stewartia ovata* and *Chelone cuthbertii*.



Figs. 1-4. DISTRIBUTION IN VIRGINIA AND THE CAROLINAS OF SPECIES WHICH ARE DISJUNCT ON THE PENINSULA OF VIRGINIA. The Peninsula is solid black. Shaded areas represent the occurrence of all species mapped in the figure. The coastal plain is east of the dotted line; the mountains are west of the dashed line; between them is the piedmont. Fig. 1. • = *Magnolia tripetala*; X = *Galax aphylla*; and *Comptonia peregrina*. Fig. 2. • = *Sanicula marilandica*; X = *Campanula americana*; and *Actaea pachypoda*. Fig. 3. • = *Dirca palustris*; and X = *Agrimonia pubescens*. Fig. 4. • = *Lathyrus venosus*; and X = *Habenaria ciliaris*.

The species *Galax aphylla* occurs very locally in the southern piedmont of Virginia with stations in Campbell and Pittsylvania counties. The type of distribution shown by *Galax* is characteristic of several species occurring on The Peninsula; i.e., widespread on the coastal plain and in the mountains but with very local colonies on the piedmont of



Figs. 5-9. Explanation under Figs. 1-4. Fig. 5. X = *Aralia racemosa*; and *Parnassia asarifolia*. Fig. 6. X = *Chelone cuthbertii*; and *Stewartia ovata*. Fig. 7. • = *Isotria medeoloides*; and X = *Helenium brevifolium*. Fig. 8. • = *Callicarpa americana*. Fig. 9. • = *Monotropsis odorata*.

Virginia. Baldwin (1941) shows that the coastal plain populations in Virginia are tetraploid and those of the mountains are diploid. It would be interesting to know the chromosome numbers of the very local piedmont populations. The chromosome complements of isolated populations of the other species with disjunct distribution would also be of considerable interest. Significant genetical differences can be expected in plants which are isolated in small colonies.

Mapping the eighteen species discussed in this paper suggested some conclusions on the reasons for the disjunct distribution of the species and may provide some clues to the history of floristic movements in the area which is now Virginia.

The coastal plain of Virginia is relatively rich in species, the mountains somewhat poorer, and the piedmont is the poorest. Moreover, the piedmont of Virginia is poorer floristically than the piedmont areas to the south of it. Many species generally distributed in the Carolinas become more restricted in distribution in Virginia. Of the three physiographic provinces dealt with here, this northward restriction or limitation in distribution is most marked in the piedmont. The piedmont of Virginia appears as an island which is poor in numbers of species within the richly diversified floras surrounding it.

Many of the Virginia species with a disjunct distribution have persisted in bogs and in soils influenced by underlying Miocene shells. It would seem from the available data that the soil conditions, topography, and climatic conditions of the coastal plain and the mountains of Virginia provided refugia where many plants persisted during the climatic stresses of the Pleistocene, such refugia being rare or absent in the piedmont. Isolation could be expected to decrease the number of biotypes in the colonies (Hultén, 1937) and result in populations with little variability and a lack of aggressiveness. Such populations apparently have narrow edaphic tolerances and are specialized for the soil conditions in which they have persisted and cannot compete successfully with other species in areas of differing edaphic values.

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